MICHIGAN STATE
UNIVERSITY

Universal Inventions, Inc.
16421 Gothard “A”
Huntington Beach Ca. 92647
USA

Dear Mr. Robert Morales:

Attached is Michigan State University College of Engineering Dynamics and Vibrations Laboratory report on the effects of BAR BUZZ KILL on a UNIVERSAL handle bar.

The report contains specific results from tests that were conducted by Michigan State University for Permawick. The results show that BAR BUZZ KILL has a positive effect on reducing the vibration in a UNIVERSAL handle bar.

Sincerely,

Thomas Theisen
Graduate Research Assistant
Michigan State University College of Engineering

COLLEGE OF
ENGINEERING

Department of
Mechanical Engineering

BAR BUZZ KILL Testing in UNIVERSAL Deuce Handlebar

Test conducted at Vibrations Lab @ MSU, East Lansing

April 19th, 2010

Project Description:

Based on recent interest shown by UNIVERSAL INVENTIONS INC. it was decided to test UNIVERSAL's Deuce handle bar with and without BAR BUZZ KILL. Results of the test are to be provided to both UNIVERSAL INVENTIONS INC. and Permawick. Mr. Robert Morales of UNIVERSAL has provided a bar to Mr. Tom Corden of Permawick and it was passed on to the Vibrations Lab here at Michigan State University.

Equipment:

- UNIVERSAL Handle Bar – Model Deuce Part Number 0609
- 2 shear-type accelerometers (352B10/10AC) manufactured by PCB Piezotronics
- 16 channel signal conditioner (481A02) manufactured by PCB
- 2 channel AR GXPA TEAC module for data recording manufactured by Tritech
- Impact hammer w/ force transducer (086B04sn3116)
- Gateway Laptop w/ required software for post processing data (TEAX GX Navi and Matlab)

Procedure:

Mass Calculations:

Mass of BAR BUZZ KILL in caulking gun before injection in bar: 735 grams
Mass of BAR BUZZ KILL in caulking gun after injection in bar: 689 grams

Mass of BAR BUZZ KILL added to UNIVERSAL handle bar 46 grams

BAR BUZZ KILL was added at both ends of the rod. Care was taken to ensure that approximately the same amount of gel was injected at both ends of the handle bar.

The handle bar was suspended and struck horizontally with an impact hammer. Accelerometers were placed on the top of the handle bar and were used to record vertical acceleration data at two locations. Sensor #1 was at 80 mm and Sensor # 2 at 160 mm from the right end of the handle bar.

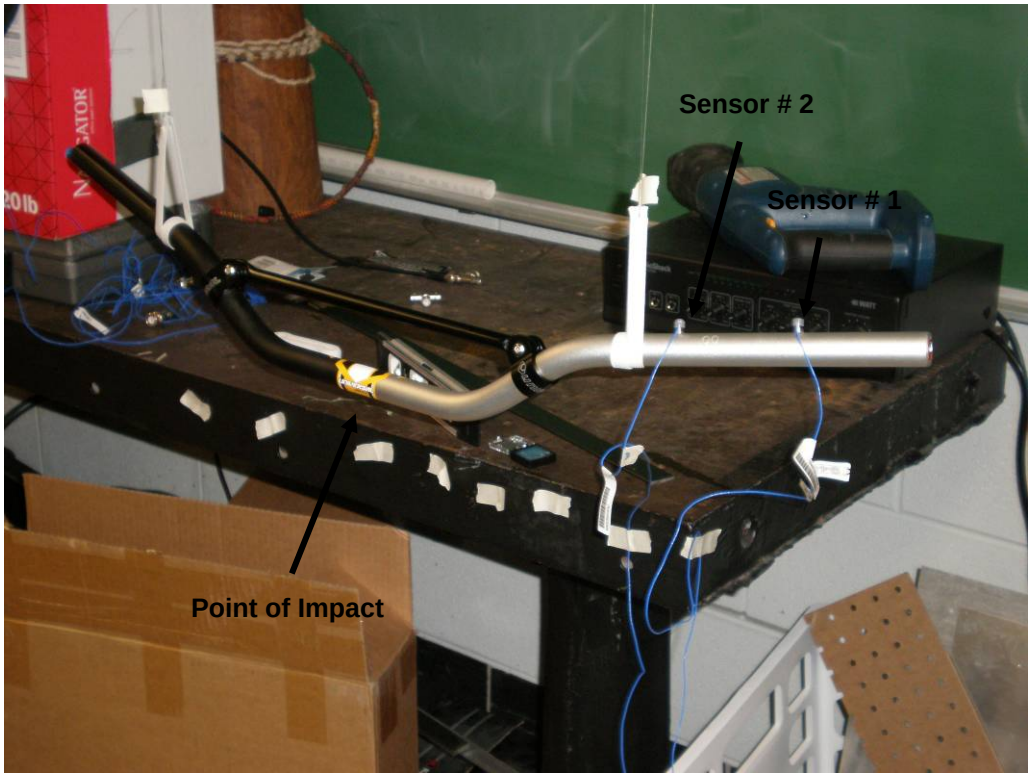

Figure 1. Experiment Set Up

5 sets of data were recorded with and without the gel to ensure accuracy of the results. The figures displayed below are the cleanest data that was retrieved. Data was sampled at 5000 Hz with the low pass filter set to 2000 Hz.

Results & Conclusions:

Below figures display the Fast Fourier Transform (FFT) of the data collected. On the x-axis is the frequency, which is the rate of occurrence is in cycles/second (Hz) units. The y axis displays the non dimensionalized amplitude of the frequency.

Figure 2 below is of sensor #1 which is located 80 mm from the end of the handle bar. In Figure 2 a large resonance peak appears at approximately 200 Hz, and a second resonance peak at approximately 350 Hz when the UNIVERSAL handle bar was without BAR BUZZ KILL. The resonance peaks have shifted to the left due to the added mass. At the first sensor BAR BUZZ KILL has reduced the magnitude of vibration by approximately 2.1 times at the first resonance peak and approximately 1.4 times at the second resonance peak.

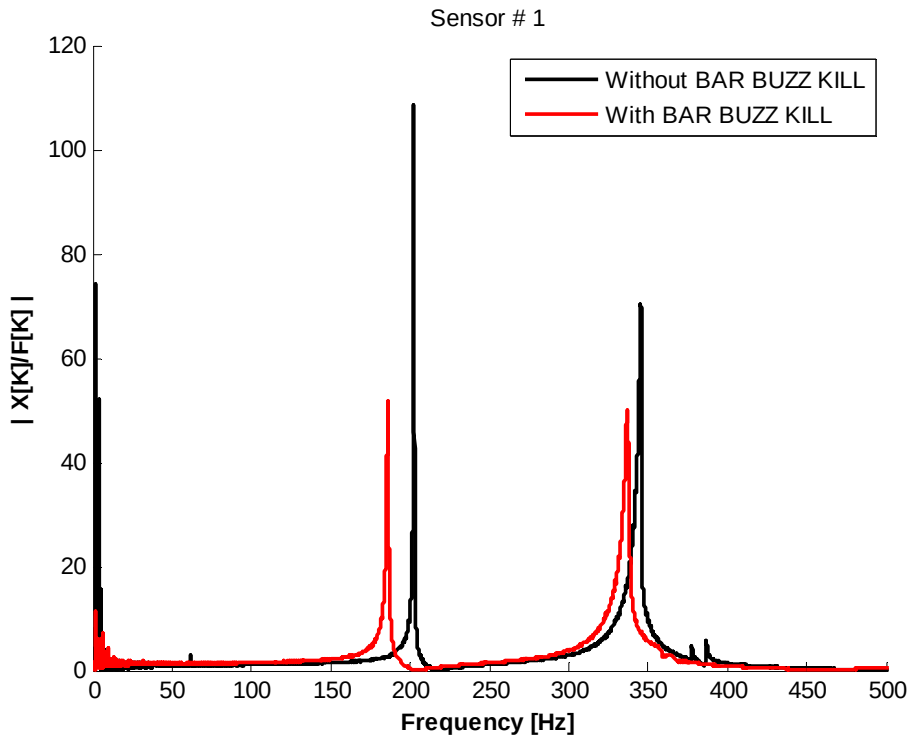

Figure 2. Sensor #1 FFT

Figure 3 below is of sensor #2 which is located further 160 mm from the end of the handle bar. In Figure 3 a large resonance peak appears at approximately 200 Hz and a second resonance peak at approximately 350 Hz when the UNIVERSAL handle bar was without BAR BUZZ KILL. Once again the resonance peaks have shifted to the left due to the added mass. At the second sensor BAR BUZZ KILL has reduced the magnitude of vibration by approximately 2.75 times at the first resonance peak and approximately 2.5 times at the second resonance peak.

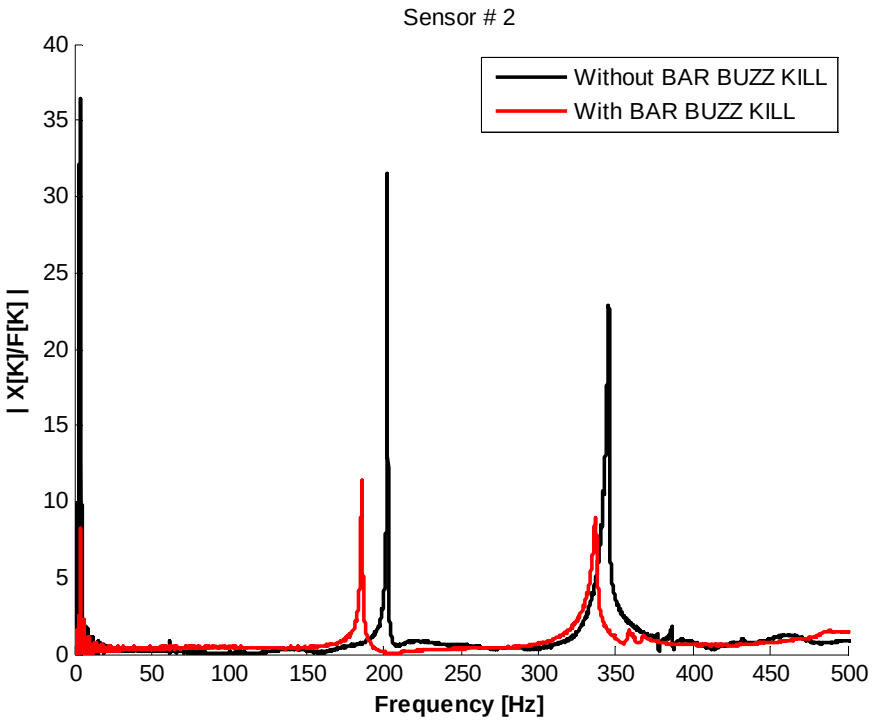

Figure 3. Sensor #2 FFT

Figures 4 & 5 show log scaled plots of the FFT for sensor # 1 and sensor # 2 respectively. It can be seen that when the UNIVERSAL handle bar was tested with BAR BUZZ KILL resulted in a lower frequency along with a reduction in amplitude.

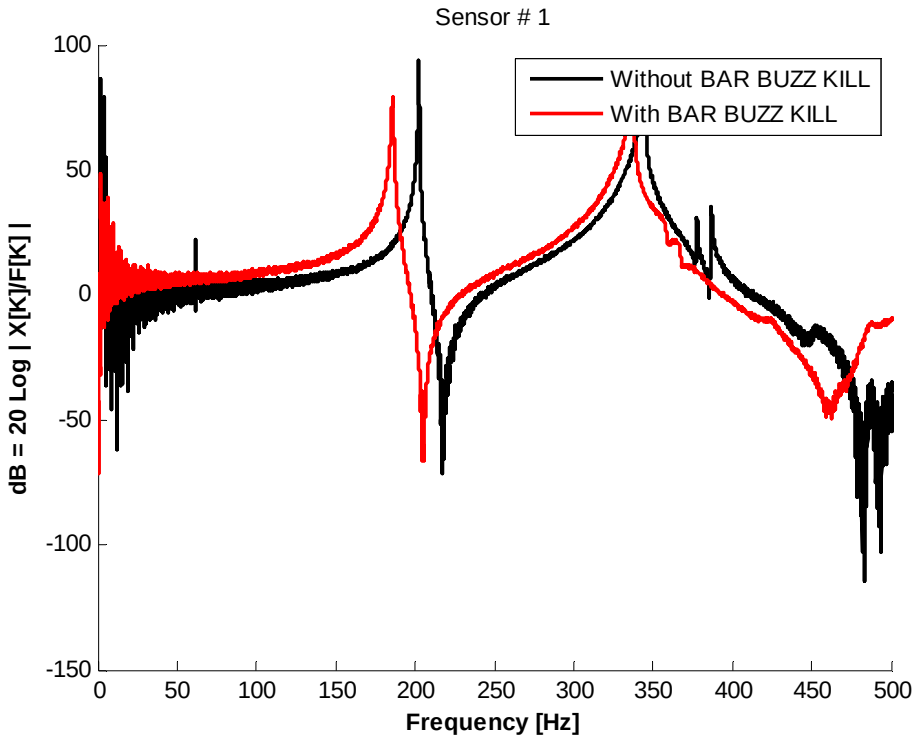

Figure 4. Sensor #1 Log FFT

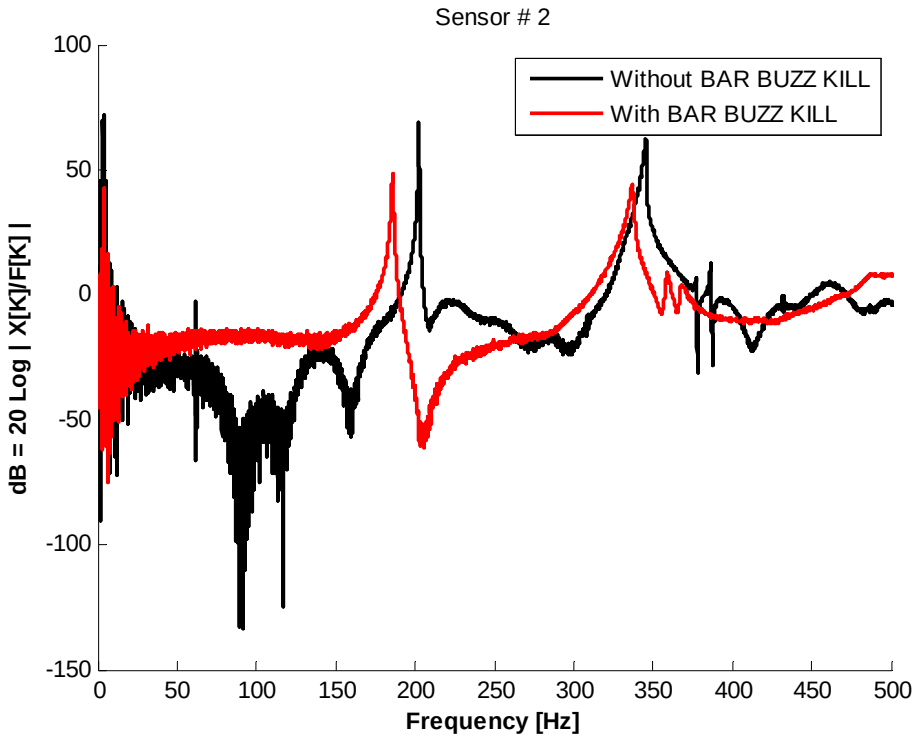

Figure 5. Sensor #2 Log FFT

Summary:

- BAR BUZZ KILL reduces the amplitude of vibration in UNIVERSAL handle bars.
- At Sensor # 1 the first resonance was reduced by 2.1 times (52%) and the second resonance by 1.4 times (28%).
- At Sensor # 2 the first resonance was reduced by 2.75 times (63%) and the second resonance by 2.5 times (60%).
- In addition to reducing vibration, BAR BUZZ KILL reduces the natural frequencies of the handle bar due to its added mass.

Things to Note

- The location of accelerometers and the string supports for the free-free boundary condition along with the location of impact for exciting the structure have a crucial relation with the responses read by the accelerometer. Care was taken to ensure almost similar locations but there would have been some errors.
- When the bar was struck some bouncing occurred with the support strings which accounts for the peaks at low frequencies.
- The tests were plotted for frequencies less than 500 Hz. Higher frequencies can be examined if applicable.

Research, Testing and Results conducted by:

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